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EXAMINER

FINDLEY, CHRISTOPHER G

ART UNIT

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2621

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/708,905

Applicant(s)

MOHAMED ET AL.

Examiner

CHRISTOPHER FINDLEY

Art Unit

2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 December 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 12/12/2007 have been fully considered but they are not persuasive.
2. Re claims 1, 16, and 23, the Applicant contends that the cited prior art (Toklu) neither teaches nor suggests that a rate of change of visual content is determined with the rate of change representing a difference of a first value and a second value, said first value representing a change of visual content of a current frame compared to a first frame, said second value representing a change of visual content of said first frame compared to a second frame, wherein said second frame is a reference frame for said first frame and said first frame is a reference frame for said current frame. However, the Examiner respectfully disagrees. Toklu discloses calculating an amount of motion between two frames (Toklu: column 8, line 15, through column 9, line 9). The motion activity found is then used to generate a motion activity (MA) curve (Toklu: column 9, lines 13-31 and Eqn. 7). Once the possible key frames are found through the process of Figs. 2A-2C in Toklu, the potential key frames undergo an elimination process (Toklu: Fig. 3), wherein the histograms for candidate frames are compared with the histogram for a reference frame (Toklu: column 13, lines 14-29). The motion activity for the candidate frame represents a first value, and the reference frame represents a second value, which are compared for the purpose of determining key frames.
3. Re claim 2, the Applicant contends that the cited prior art fails to teach or suggest that the rate is computed as a difference of a first representative magnitude and a

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second representative magnitude. However, the Examiner respectfully disagrees.

Upon further review of the prior art, Toklu discloses in Eqn. 7 that the MA value is calculated by taking a square root of a squared value, which by definition yields an absolute value, or magnitude, for each (x, y) coordinate entered into the equation.

4. Re claim 6, the Applicant contends that the cited prior art fails to teach or suggest that only active pixels are used in computing the displacement magnitude. However, the Examiner respectfully disagrees. One of ordinary skill in the art at the time of the invention would have found it obvious that if a pixel were inactive (meaning that no change was present), there would be no zoom, rotation, pan or tilt values to be entered into Eqn. 7 of Toklu, and that pixel would not add to the motion activity (MA) value.

5. Therefore, the Examiner maintains the previous rejection of claims 1-28. A modified copy of the previous rejection, reflecting changes made via the amendment filed 12/12/2007, is included below.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. **Claims 1-2, 15-17, and 23-24 are rejected under 35 U.S.C. 102(a) as being anticipated by Toklu et al. (US 6549643 B1).**

Re claim 1, Toklu discloses a method of identifying key video frames in a sequence of image frames, each of said sequence of image frames containing a plurality of pixels, each of said plurality of pixels corresponding to a corresponding point of an area based on which said sequence of image frames are generated, said method comprising: determining a rate of change of visual content of each current frame from a corresponding reference frame, each of said current frame and said reference frame being comprised in said sequence of image frames (Toklu: Fig. 2B, step 212), wherein said rate of change represents a difference of a first value and a second value, said first value representing a change of visual content of a current frame compared to a first frame, said second value representing a change of visual content of said first frame compared to a second frame, wherein said second frame is a reference frame for said first frame and said first frame is a reference frame for said current frame (Toklu: column 8, line 15, through column 9, line 9, calculating an amount of motion between two frames; Toklu: column 9, lines 13-31 and Eqn. 7, motion activity found is then used to generate a motion activity (MA) curve; Toklu: Fig. 3, the potential key frames undergo an elimination process; Toklu: column 13, lines 14-29, the histograms for candidate frames are compared with the histogram for a reference frame, wherein the motion activity for the candidate frame represents a first value, and the reference frame represents a second value, which are compared for the purpose of determining key frames); and selecting said current frame as a key video frame (Toklu: Fig. 2B, step 218) if said rate exceeds a first threshold value (Toklu: Fig. 2B, step 214).

Re claim 2, Toklu discloses a majority of the features of claim 2, as discussed above in claim 1, and Toklu additionally discloses determining a displacement magnitude of each moved pixel of said current frame compared to the position in said first frame and of said first frame compared to the position in said second frame (Toklu: column 8, line 15, through column 9, line 9, calculating an amount of motion between two frames); and computing a first representative magnitude of said displacement magnitude for said moved pixels of said current frame compared to said first frame, and a second representative magnitude of said displacement magnitude for said moved pixels of said first frame compared to said second frame (Toklu: column 8, line 15, through column 9, line 9, calculating an amount of motion between two frames; Toklu: column 9, lines 13-31 and Eqn. 7, motion activity found is then used to generate a motion activity (MA) curve), wherein said first value and said second value respectively equal said first representative magnitude and said second representative magnitude such that said rate is computed as a difference of said first representative magnitude and said second representative magnitude (Toklu: Fig. 3, the potential key frames undergo an elimination process; Toklu: column 13, lines 14-29, the histograms for candidate frames are compared with the histogram for a reference frame, wherein the motion activity for the candidate frame represents a first value, and the reference frame represents a second value, which are compared for the purpose of determining key frames).

Re claim 15, Tolku discloses that said first frame and said current frame are respectively adjacent to said second frame and said first frame in said sequence of frames (Toklu: column 5, line 65, through column 6, line 7).

Claim 16 recites the corresponding computer readable medium containing a computer program for executing the method of claim 1, and, therefore, has been analyzed and rejected with respect to claim 1 above.

Claim 17 has been analyzed and rejected with respect to claim 2 above.

Claim 23 recites the corresponding system for executing the method of claim 1, and, therefore, has been analyzed and rejected with respect to claim 1 above.

Claim 24 has been analyzed and rejected with respect to claim 2 above.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 3-4, 6, 9-11, 13, 18-19, 21, 25-26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tolku et al. (US 6549643 B1) in view of Zhang et al. (US 7027513 B2).**

Re claim 3, Toklu discloses a majority of the features of claim 3, as discussed above in claim 2, but Toklu does not explicitly state that said first representative magnitude for said current frame equals an average of motion energy vector

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magnitudes of said moved pixels of said current frame in comparison with corresponding pixels of said first frame. However, Zhang discloses a method for extracting key frames from video using a triangle model of motion based on perceived motion energy, where the average magnitude of the motion vectors for a particular frame is calculated (Zhang: column 9, lines 25-38), and the average magnitude is used to calculate the perceived motion energy (Zhang: column 9, lines 39-49). Since both Tolku and Zhang relate to selecting key video frames based on motion analysis, one of ordinary skill in the art at the time of the invention would have found it obvious to combine the triangle method of Zhang with the histogram analysis of Tolku in order to provide a uniform and consistent selection method that yields a proper number of key frames that are most representative of the video sequence content (Zhang: column 5, lines 34-37). The combined method of Tolku and Zhang has all of the features of claim 3.

Re claim 4, the combined method of Tolku and Zhang discloses that said current frame is selected as said key video frame only if said first representative magnitude exceeds a second threshold (Toklu: Fig. 2B, when the cumulative motion in steps 220, 221, and 222 exceeds a threshold, the frame is selected as a key frame in step 223).

Re claim 6, the combined method of Tolku and Zhang discloses identifying a plurality of active pixels in said current frame, wherein a pixel is considered an active pixel if a corresponding displacement magnitude is outside of a range, wherein only said plurality of active pixels are used by said computing (Toklu: Fig. 2C, step 231).

Re claim 9, the combined method of Tolku and Zhang discloses enabling a user to specify one of a plurality of key video frames, wherein said plurality of key video frames are selected by said selecting (Zhang: Fig. 1, element 120; column 5, lines 43-44, indicate that the user may use the key frames to select the desired section of the video for display); and displaying said specified one of said plurality of key video frames (Zhang: Fig. 1, element 120; column 5, lines 43-44, indicate that the user may use the key frames to select the desired section of the video for display).

Re claim 10, the combined method of Tolku and Zhang discloses displaying a prior key video frame and a next key video frame in relation to said specified one of said plurality of key video frames, wherein said prior key video frame and said next key video frame are comprised in said plurality of key video frames (Zhang: Fig. 1, element 120, key frames are displayed in a sequence).

Re claim 11, the combined method of Tolku and Zhang discloses generating a display indicating the manner in which said plurality of key video frames are interspersed in said sequence of image frames, wherein said enabling is based on said display (Zhang: Fig. 12, the key frames are shown along with their corresponding frame numbers).

Re claim 13, the combined method of Tolku and Zhang discloses generating a display listing said plurality of key video frames, wherein said enabling is based on said display (Zhang: Fig. 1, element 120; column 5, lines 43-44).

Claim 18 has been analyzed and rejected with respect to claim 3 above.

Claim 19 has been analyzed and rejected with respect to claim 4 above.

Claim 21 has been analyzed and rejected with respect to claim 6 above.

Claim 25 has been analyzed and rejected with respect to claim 3 above.

Claim 26 has been analyzed and rejected with respect to claim 4 above.

Claim 28 has been analyzed and rejected with respect to claim 6 above.

5. Claims 5, 7, 8, 20, 22, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tolku et al. (US 6549643 B1) in view of Zhang et al. (US 7027513 B2) as applied to claims 3-4, 6, 9-11, 13, 18-19, 21, 25-26, and 28 above, and further in view of Ma et al. (US 20040088723 A1).

Re claim 5, the combined method of Tolku and Zhang discloses a majority of the features of claim 5, as discussed above in claims 1-4, but does not specifically disclose that the first threshold and the second threshold are adjusted dynamically to ensure that a desired number of frames are selected as key video frames in a specified duration. However, Ma discloses a method for generating a video summary, where a binarization threshold is estimated in an adaptive manner (Ma: paragraph [0081]) when analyzing a video sequence for selecting key frames. Since Tolku, Zhang, and Ma relate to selecting key frames in a video sequence, one of ordinary skill in the art at the time of the invention would have found it obvious to combine the attention modeling of Ma with the combined key frame selection method of Tolku and Zhang in order to create a representative video summary consisting of very short video clips, which contain the video immediately preceding and immediately following key frames that have been

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selected (Ma: Fig. 20). The combined method of Tolku, Zhang, and Ma has all of the features of claim 5:

Re claim 7, the combined method of Tolku, Zhang, and Ma discloses that said range set by a distance of two times the variance from the mean of a distribution (Ma: paragraphs [0081]-[0082], the threshold is a function of the variance).

Re claim 8, the combined method of Tolku, Zhang, and Ma discloses that said representative magnitude comprises an average of said active pixels (Ma: equation (12) and paragraph [0084]).

Claim 20 has been analyzed and rejected with respect to claim 5 above.

Claim 22 has been analyzed and rejected with respect to claim 7 above.

Claim 27 has been analyzed and rejected with respect to claim 5 above.

6. Claims 12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tolku et al. (US 6549643 B1) in view of Zhang et al. (US 7027513 B2) as applied to claims 3-4, 6, 9-11, 13, 18-19, 21, 25-26, and 28 above, and further in view of Sull et al. (US 20060064716 A1).

Re claim 12, the combined method of Tolku and Zhang discloses a majority of the features of claim 12, as discussed above in claims 1-4, 6, and 9-11, but does not specifically disclose that the display comprises a pie chart. However, Sull discloses techniques for navigating multiple video streams, where textual/visual information, such as a pie chart, may be displayed along with poster-thumbnails on the video selection screen for the user interface (Sull: paragraph [0307]). Since Tolku, Zhang, and Sull all

relate to representative images for video sequences, one of ordinary skill in the art at the time of the invention would have found it obvious to combine the textual information of Sull with the key frame selection of the combined method of Tolku and Zhang in order to provide the user with more information, such as date and time of broadcast (Sull: paragraph [0307]), for improving the user's ability to quickly find the desired video segment (Zhang: column 5, lines 44-45). The combined method of Tolku, Zhang, and Sull has all of the features of claim 12.

Re claim 14, the combined method of Tolku, Zhang, and Sull discloses that said display comprises a button, which when selected, causes said display to be generated (Sull: Figs. 6A and 6B, the thumbnail images act as buttons, so that when selected by the user, the corresponding video clip is displayed).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

a. Feature based hierarchical video segmentation

Bozdagi et al. (US 6493042 B1)

b. Method of selecting key-frames from a video sequence

Wilf et al. (US 7184100 B1)

c. System for automatic video segmentation and key frame extraction for video sequences having both sharp and gradual transitions

Zhang et al. (US 5635982 A)

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact

Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTOPHER FINDLEY whose telephone number is (571)270-1199. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha D. Banks-Harold can be reached on (571) 272-7905. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Christopher Findley/

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